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MAYNARD OWEN WILLIAMS

ON CELEBES, A HAPPY MERCHANT WRAPS UP A NICKEL'S WORTH OF SHRIMP IN NATURE'S PACKAGE—A TWISTED PALM LEAF (Bulletin No. 4)

Bulletin No. 1, January 9, 1950.

Drought Perils New York's Water Supply

MAN can build reservoirs but nature must fill them. Droughts in New York State in 1949 and in California in 1947-48 have borne this out by imposing severe tests on the fresh-water supply systems of New York City and Los Angeles—two marvels of American engineering. The specter of dry or drying reservoirs has made New Yorkers adopt water-saving practices never before considered.

The mighty Hudson flows past New York and the city is nearly surrounded by arms of the ocean. But with "water, water everywhere," Father Knickerbocker's metropolis must reach far inland to fresh mountain streams for drops to drink. Salt and pollution make use of the lower Hudson impractical.

Catskills Provide Most of City's Water

Wells served Manhattan Island colonists from New Amsterdam days until 1776, when a reservoir was built, and hollow-log water pipes were laid for a New York of 22,000 souls. Derision greeted state governor DeWitt Clinton in the 1820's when he proposed going 40 miles north to the Croton River for an "inexhaustible" water supply (map, next page). Croton water, a reality since 1842, now supplies about one-fourth of New York City's daily demand.

Most of the rest of the city's normal draft of 1,200,000,000 gallons a day comes by giant aqueduct nearly 100 miles from the Schoharie and Esopus watersheds in the Catskills. By 1956, reservoirs now under construction will impound upper Delaware River water, adding vast new resources to New York's mountain-water storage system.

Los Angeles, out of reach of Aleutian storms that drench America's west coast farther north, in early years quenched its thirst from its Los Angeles River. The rapid rate of growth by 1907, however, dictated construction of a 238-mile aqueduct to bring in Owens River water, product of melting snows on the high Sierra Nevada.

Today's greater Los Angeles population, ten times the 300,000 of 40 years ago, is still largely supplied by the Owens River. Its vast new reserve is behind Parker Dam, 155 miles downstream from Hoover Dam on the Colorado River. About one-sixth of the current daily draft of Los Angeles and twelve neighboring cities comes 392 miles from the Parker Dam via the Metropolitan Aqueduct, a gigantic construction achievement.

Great Lakes an Easy Source of Supply

San Francisco draws through a tunnel under the Coast Range from Hetch Hetchy River waters 170 miles away. Boston created the largest lake in Massachusetts on a branch of the Connecticut River, and built a huge tunnel to bring its water through the hills. Seattle has abundant soft water from a mountain stream fed by the snows of the Cascades. Albany draws a plentiful supply from its big reservoir filled by Adiron-

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FORMOSANS LOVE A PARADE. IN TAIPEH, CHINESE NATIONALIST CAPITAL ON THE "LAST-STAND" ISLAND (Bulletin No. 3), TOWNSFOLK CHEER AS MEN PULL GIRL-DECORATED FLOATS BY

germ-laden water.

Man's Oldest Town May Reveal Secret Past

THE barren wastes of southern Iraq have for centuries closely guarded the mystery of their ancient settlements. But they soon may give up the secret of what was perhaps the first experiment in town-building.

At the ruins of Eridu, Iraqi archeologists are resuming work on excavations which two years ago first revealed to the modern world the ancient—almost legendary—city. They hope to unearth further evidence to support the theory that relics of the ancient past found at this site are the remains of the oldest city in the world.

The World's First City

Buried beneath dull gray-brown sand mounds about 130 miles northwest of the Persian Gulf, Eridu has already been identified as the first settlement in prehistoric Mesopotamia (modern Iraq). Archeologists working there during the past three years have established that it may have been there as long ago as 5,000 B.C.—antedating near-by Ur, long considered the most ancient of cities (illustration, next page).

Besides the promise of archeological findings thus far, there is considerable tradition to suggest that Eridu was truly the world's first city. The Babylonian story of creation states: "All the lands were sea; then Eridu was made."

This early literary mention is interpreted as referring to the time when the Persian Gulf in fact did cover the land on which Eridu was later built. The Iraqi scientists now believe that the first settlers in Sumer (the southern region of ancient Babylonia) established a primitive market place at Eridu early in the fifth millennium B.C. and lived off the fertile marshlands left by the receding Persian Gulf.

To date, excavations have gone a long way toward supporting this idea. In delving through 18 successive layers of ruins, the archeologists have found traces of a pre-Sumerian culture which antedates the so-called Al 'Ubaid period (about 4,000 B.C.), which was once considered the oldest civilization of the region. It was this discovery that proved the truth of Eridu's claim to be Mesopotamia's oldest city.

Excavations Reveal Layers of Temples

The ruins of Eridu were first discovered in 1855 by J. E. Taylor, then British consul at Basra. Crowning the dusty mound were the crumbling remains of a large temple of about 2,000 B.C. But early attempts to explore the site were defeated time and again by shifting desert sands, poor communications, and hostile native tribes.

Since early in 1947, however, Iraqi archeologists have succeeded in digging through the centuries of sand to the site of the first temple Eridu's founders raised to their patron god, Enki. The scientists found that each time the city was rebuilt, down through the centuries, its inhabitants had erected a new and larger shrine to this deity.

Seventeen layers of temples were uncovered, the final one having no

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dack streams. Baltimore has two large reservoirs a few miles north of the city—Prettyboy and Loch Raven, fed by the Gunpowder.

Great Lakes cities like Chicago and Duluth have a comparatively simple problem. Their supply pipes reach two to eight miles offshore to bring lake water from beyond the range of city-caused pollution.

Many riverside cities, large and small, draw their supply from near-by upstream. The flow of Washington's Potomac is enough for six New Yorks, and the capital's only bottleneck is filtration-plant capacity. Philadelphia's problem is making its large Schuylkill and Delaware river supply fit for human use. London drinks from the rivers Thames and Lea, and also from numerous artesian wells which have been driven into its underlying layer of chalk.

At parched Bahrein in the Persian Gulf, water sellers collect drinking water at the bottom of the salt sea. They dive in with collapsed goatskins and take fresh water from fountains in the floor of the gulf.

At arid Baku on the salty Caspian, sea water can be distilled at low cost because of plentiful oil heat. In most dry places, however, sea distillation cost is prohibitive. The commercial harnessing of atomic energy may remove this drawback in the distant future.

Pure, fresh water is a rarity in many parts of the world. The great consumption of wine in southern Europe, of beer in northern Europe, and of tea in the Orient is in part an attempt to avoid germ-laden water.

DRAWN BY THEODORA PRICE AND IRVIN E. ALLEMAN

HUDSON TRIBUTARIES PROVIDE NEW YORK'S WATER

The series of reservoirs along the small Croton River lie to the east of the tidal Hudson. West of Kingston is Ashokan Reservoir on Esopus Creek. East of Stamford, N. Y., lies Schoharie Reservoir.

Jap-Built Formosa City Is "China" Capital

CHINA'S refugee nationalist government ironically finds itself indebted to its old Japanese foes for preparing Taipeh, Formosa's largest city, so well for its present role as a last-ditch provisional capital.

Although it has been a Chinese-populated city for centuries, the nationalists' new seat of government on the island "fortress" off south China is largely a product of Japanese planning. Most of its modern government buildings, large public parks, museums, and palm-shaded boulevards were built during the 50 years of Japanese control. A majority of current maps still identify it as Taihoku, its Japanese name in this period.

Walls Torn Down

When Formosa was ceded to Japan by the treaty of Shimonoseki in 1895, its young capital at Taipeh was little more than a cluster of backward Chinese villages. The city embraced three semi-independent settlements, each boasting its own administrators and jealously guarded traditions.

The Jonai district, now the city's heart, once was sealed off from its two neighbors by a 12-foot wall which the Japanese razed to make room for expansion. Converted into a spacious center for island government, this section looks like a typical Japanese town oddly planted in the midst of Chinese territory.

By contrast, the atmosphere of south China's mainland cities predominates in the older northeast district of Daitotei, which is Taipeh's business and amusement center. A visitor there may encounter a noisy marriage or funeral procession at almost any time of the day (illustration, inside cover). Puppet shows are staged on street corners, "singsong" girls entertain in teahouses, and pushcart vendors hawk their wares everywhere along the crowded streets.

Manka, the oldest section, sprawls eastward from Jonai to the Tamsui River. It traces its beginnings back to the early 18th century when it flourished as an inland port, and later as a lair for pirates. Now this settlement has largely deteriorated into an overcrowded slum, its early prosperity long vanished.

Population Zooms

Under the Japanese these three sections were amalgamated into a single city in 1920. As the building and modernization progressed, Taipeh grew in importance as a strategic center only 18 miles southwest of Keelung (Kirum), Formosa's chief port.

When the island was returned to China after Japan's defeat in 1945, the nationalists resumed control over a city which had become the largest and in many respects the most modern on Formosa. Its 1940 population of well over 300,000 has zoomed with the recent influx of thousands of Chinese mainlanders fleeing the communist armies.

Although Taipeh supports few manufacturing plants, its economy prospers by handling much of the industrial output and rich agricultural

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foundation but the sand which once had been under the waters of the Persian Gulf. At the 16th level it was discovered that the pottery of the Al 'Ubaid period had disappeared. A completely new style was unearthed, elaborately decorated. The type of architecture also differed from that of the upper levels.

This marked difference between the pottery and the architecture of the Al 'Ubaid people and that of those who came before them exploded the theory that the first settlers of southern Iraq had been uncivilized swamp dwellers.

The archeologists also discovered that these early city dwellers had developed remarkable skill in caring for their dead. At the sixth level down, a cemetery of almost 1,000 graves was unearthed. The tombs studied so far have contained such archeological treasures as early Sumerian pottery, bead ornaments and figurines, and the model of a boat said to be the earliest ever made.

NOTE: Eridu is shown on the National Geographic Society's map of Bible Lands and the Cradle of Western Civilization. Write the Society's headquarters, Washington 6, D. C., for a price list of maps.

For further information, see "Mountain Tribes of Iran and Iraq," in the *National Geographic Magazine* for March, 1946*; and "Forty Years Among the Arabs," September, 1942; and, in the GEOGRAPHIC SCHOOL BULLETINS, February 23, 1948, "Iraq Air Bases Contrast with Bible Sites." *(Issues marked with an asterisk are included in a special list of Magazines available to teachers in packets of ten for $1.00.)*

SUPERVISED NATIVE WORKMEN AT UR DEMONSTRATE THE TECHNIQUE OF ARCHEOLOGICAL EXCAVATION NOW BEING USED AT ERIDU

Ur, home of Abraham, was lost to mankind for millenniums. In 1854, J. E. Taylor identified the site. Excavation carried on in the 1920's associated Ur with the Bible stories of the Creation and the Flood and stamped it as civilization's oldest city. Now, archeologists at Eridu, 14 miles south, have dug through successive layers to find the artifacts of a culture antedating that of Ur.

Package Industry Becomes Big Business

THE Christmas holidays have whirled by, leaving a trail of crumpled tissue paper, tangled silver ribbon, and boxes of innumerable materials: cardboard—both glossy and corrugated, cellophane, plastics, tin, and wood. All these containers helped to make December top month in an enormous industry—packaging in its many forms.

It is easy to think of steel as big business. But so large has the nation's varied packaging industry become that its estimated five-billion-dollar annual value is greater than that of all steel products made.

Nature Is Man's Rival in Packaging

Only the automotive and construction industries use more steel than do the package makers. In addition to enormous quantities of steel, packaging consumes vast amounts of tin, glass, paper, wood, fabrics, fibers, plastics, and other materials.

Before man ever bothered to wrap things up, nature was busy making packages for her countless products. These include such masterpieces as the egg shell (illustration, next page), corn husk, bean pod, and cocoon, to mention only a few.

Before the era of paper, cartons, bags, and cellophane, man used such natural wrapping materials as leaves, grasses, and skins. Even today, on the traditional "palm-fringed" Pacific island, the "fringe" serves the purpose of a paper bag (illustration, cover).

The ancient Egyptians mummified their dead, creating, with yards of spiraling strips of cloth, a good imitation of the cocoon. In the time of the Crusades the coat of mail packaged the damageable knight.

In the Napoleonic wars British forces carried food supplies in clumsy tinned iron cans. By the 1860's food was being canned on a sizable scale. Fruits, fish, vegetables, and condensed milk were "put up" by this method.

Newspapers Doubled as Containers in Pre-packaging Era

Nevertheless, much later in the same century tin cans were still far from common. Tea came from the Orient in large tin boxes, gaily decorated, which later would be prized by antique dealers, who sold them for almost any use except that for which they had been made. In the stores, most of the stock was kept in wooden barrels and big boxes. The cracker barrel preceded the neat ranks of cardboard boxes in assorted sizes which display the picture, in natural color, of their crisp contents. Last week's newspaper was the usual wrapping for retail items from glue flakes to rib roasts.

In those days, containers had one main purpose—to contain. Today they also protect from germs, oxidation, and transit damage. They supply sales appeal that inspires "impulse buying," and packaging progress knows no bounds. Large food markets carry as many as 3,000 separate articles packaged in different sizes to suit the need of the consumer. Sugar, tea, rice, and crackers are typical items long sold from bulk containers which are now alluringly packaged in factories.

Frozen-food cabinets offer meats, vegetables, fruit and vegetable

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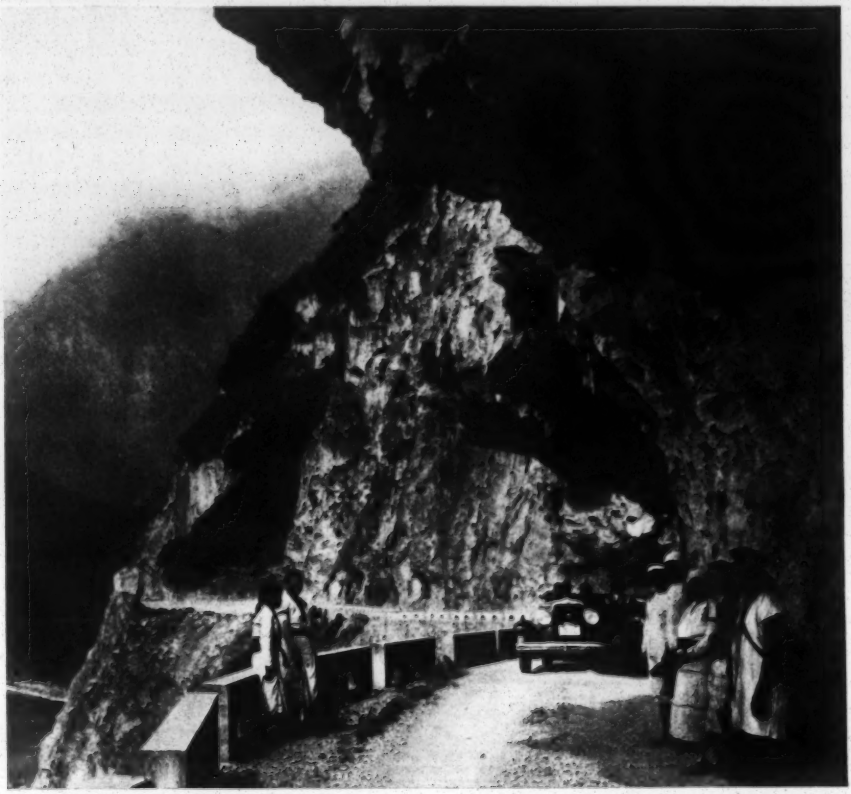
produce of northern Formosa. In the Daitotei section are the foreign teahouses, where the island's tea crop is sorted and packed each summer for shipment.

When the nationalists gave up Chungking, they announced Chengtu as their next capital. The communists advanced so rapidly that the Szechwan city was likewise soon abandoned in favor of Formosa. The "last-stand" island has flat plains on the side nearest China proper, but its eastern coast is one of the most precipitous in the world (illustration, below).

NOTE: Formosa is shown on the Society's map of China. It also appears in a large-scale inset on the map of Japan and Korea.

For additional information, see "I Lived on Formosa," in the *National Geographic Magazine* for January, 1945*; and "Japan and the Pacific," April, 1944.

See also, in the GEOGRAPHIC SCHOOL BULLETINS, April 5, 1948, "China's Formosa Is Raw-Material Storehouse"; and "Formosa, Rugged Island of Tea and Camphor," April 14, 1947.



ABORIGINES STAND BACK FOR TRAFFIC ON THE RUGGED EAST COAST OF FORMOSA

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1949 Expeditions Probed Land, Sea, and Air

SCIENTIFIC expeditions, roaming every continent and probing the mysteries of ocean depths and atmospheric heights, pushed back frontiers of knowledge in all quarters of the globe during 1949.

United States anthropologists studied native life from the mist-shrouded Aleutians to jungle-clad South Pacific isles. As part of one program called SIM—scientific investigations in Micronesia—a versatile team of scientists did research ranging from languages to poison fish.

University of California pick-and-shovel scientists unearthed a treasure trove of fossils in Colombia's Magdalena Valley which fills a wide gap in the story of South America's prehistoric animal life.

South Africa shed more light on the history of man's development. John T. Robinson, assistant to Dr. Robert Broom of the Transvaal—who last year found remains of the giant Swartkrans man—discovered the jawbone of another so-called "missing link," a borderline ape-man or man-ape. Johannesburg's Professor Raymond A. Dart announced discovery of a prehuman, manlike race of pygmies who lived more than a million years ago, walked erect, used fire, and hunted with clubs. Czechs reported uncovering the skeleton of a mammoth-hunter of 30,000-50,000 B.C., and Japanese found traces of a "Dawn man" who inhabited their islands 5,000 years ago.

University of Istanbul's Professor Helmuth Bossert discovered in southern Turkey a bilingual tablet with inscriptions in old Phoenician and Hittite. It may provide the key to ancient Hittite writings as the famous Rosetta Stone did for Egyptian hieroglyphics.

The first United States archeological team to comb Afghanistan stumbled on what is believed to be the lost city of Peshawarum, an Afghan legend for centuries. Once garrisoned by troops of Alexander the Great, it reached its peak during the Crusades and became a ghost city when its water supply apparently failed.

In his tenth archeological trip to Middle America for the National Geographic Society and Smithsonian Institution, Dr. Matthew W. Stirling explored Panama's Chiriqui highlands by helicopter, truck, and canoe.

Great Britain, France, Norway, Australia, Chile, and Argentina moved separately to establish permanent bases in Antarctica. Britain began operations to rescue eleven men of the Falkland Islands Dependencies Survey marooned by pack ice at a base in Graham Land. Norway, Britain, and Sweden launched a two-year expedition to Queen Maud Land. Scientists will explore ice-free areas reported in the interior.

Commander Donald B. Macmillan, on his 28th and stormiest Arctic trip, charted unknown fiords on the coasts of Labrador and Baffin Island. Canadian exploration of unvisited islands in Foxe Basin north of Hudson Bay put some new names on the map. One island was named for Britain's infant Prince Charles.

With a special nine-lens aerial camera, United States Coast Guard and Coast and Geodetic Survey teams continued mapping Alaska. The Air Force announced that it has mapped nearly half of the rugged terri-

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juices, and seafoods in ever-increasing array of packages. Currently, even unfrozen meat cuts, fresh fruits, and green vegetables gleam in transparent wrappings, marked with weight and price.

During World War II the tin shortage caused can production to drop two-fifths from its 1941 flood of 25 billion units. It has since regained that level. Electrolysis now makes it possible to tinplate steel so that only one-half of one per cent of the can is tin. Earlier plating methods required one per cent tin.

Navy Packages Inactive Ships

Glass, used for containers in ancient times, advanced from under ten billion units in 1941 to nearly double that figure in recent years. As postwar glass is more durable, its use in packaging has greatly increased. Plastics rivaling metal and glass in rigidity brighten the future of this important segment of America's packaging industry.

The very word package, once neglected, has come into its own. The Navy's postwar program of packaging inactive fighting ships (putting them in cold storage) is well known. They are coated with thick strippable plastic, from underwater hull to turrets, winches, and seaplanes. One can now buy a packaged (pre-fabricated) house or gymnasium, a packaged week end in New York, a packaged radio program, or a packaged month's vacation tour, almost as simply as one can step into a store and purchase a package of cheese or a box of cake mix.

J. BAYLOR ROBERTS

DUAL PACKAGING SAFELY TRANSPORTS FRAGILE EGGS FROM COOP TO HATCHERY

From a rack of turkey eggs, already shell-packaged by nature, a packer on a Turlock, California, ranch places an egg in each "pigeonhole" of a man-made container. This carefully constructed box will convey the eggs unbroken to hatcheries in the Midwest, demonstrating efficient cooperation between man and nature. Boxes of this type are used for packing many breakable articles such as chinaware, glass, and bright and brittle Christmas-tree ornaments.

tory, much of it previously unexplored or uncharted. The Royal Canadian Air Force mapped vast areas of remote Yukon and Northwest territories.

Six "floating laboratories" from the Woods Hole (Massachusetts) Oceanographic Institution charted North Atlantic tides and currents and tackled a variety of marine problems. The University of Hawaii announced an expedition to explore "untouched natural resources" under the Pacific. The U.S. Navy began a systematic survey of the Atlantic floor.

Other depths—the vast outer world of the heavens—came in for attention. Reaching some 300 million light years into mysterious space, the 48-inch "Big Schmidt" telescopic camera began taking pictures atop Palomar Mountain (illustration, below) in July for the world's first definitive sky atlas—co-sponsored by the National Geographic Society and the California Institute of Technology.

High altitude, high-latitude cosmic-ray research above Churchill, on Canada's Hudson Bay, exploded the theory that the sun has a permanent magnetic field like the earth. Instrument-carrying free balloons soared 20 miles into the outermost one per cent of the earth's atmosphere. The expedition, led by Dr. Martin A. Pomerantz, was part of a research program begun in 1946 by the National Geographic Society and the Bartol Foundation of Philadelphia's Franklin Institute. The National Defense Board of Canada cooperated.

In hidden Nepal proper, a National Geographic Society-Yale University-Smithsonian Institution expedition led by Dr. Dillon Ripley made extensive wildlife collections and bagged a rare spiny babbler. The last specimen of this bird was taken 106 years ago.

Deep in the flooded *llanos* of Venezuela's State of Apure, Dr. Paul A. Zahl headed an expedition, also sponsored by the National Geographic Society, to study another rare bird, the flashing scarlet ibis.

SPENCE

AT PALOMAR OBSERVATORY ASTRONOMERS HAVE STARTED A FOUR-YEAR SKY ATLAS PROJECT

The dome at the right contains a 200-inch mirror, most powerful in the world. Near the road winding toward the top of the picture now stands the "Big Schmidt," a 48-inch telescopic camera. In it, work progresses on the National Geographic Society-California Institute of Technology sky atlas —largest project of its kind ever undertaken. Palomar is 75 miles northeast of San Diego, California.